





Test Report



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS

Report No	EN3532-2
Client	Powercast Corporation Charlie Greene
Address	566 Alpha Drive Pittsburgh, PA 15238
Phone	412-436-4077
Items tested	LS1400
FCC ID	2AAMXLS1400
IC	11250A-LS1400
FRN	0002862225
Equipment Type	Part 15.247 Digitally Modulated
Equipment Code	DTS
FCC/IC Rule Parts	47 CFR 15.247, RSS-210 Issue 8, RSS GEN Issue 3
Test Dates	December 26 - 31, 2013 and January 10, 2014
Results	As detailed within this report
Prepared by	 Tuyen Truong A. – Test Engineer
Authorized by	 Christopher Reynolds
Issue Date	<u>2/20/2014</u>
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 26 of this report.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.



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Form Final Report REV 7-20-07 (DW)



Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.247. The product is the LS1400. It is a digitally modulated transmitter that operates in the range 902-928MHz. Product was tested with an on board antenna with a gain of 2.5dBi permanently attached.

We found that the product met the above requirements without modification. Charlie Greene from Powercast Corporation was present during the testing. The test sample was received in good condition.

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	November 10, 2012



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Test Methodology

Radiated emission testing was performed according to the procedures specified in FCC Guidance for performing compliance measurement on DTS operating under section 15.247, April 19, 2013 and ANSI C63.10 (2009) and C63.4 (2009). Radiated Emissions were maximized by rotating the device around its axes as well as varying the test antenna’s height and polarity. The device antenna cannot be maximized separately.

Conducted emission at the antenna port was not performed since EUT antenna was permanently attached.

The EUT operating voltage is 3.6Vdc (Battery Powered)

Low operating channel frequency = 902MHz

Mid operating channel frequency = 915MHz

High operating channel frequency = 927MHz

The following bandwidths were used during radiated spurious emissions.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-10GHz	1MHz	3MHz



Product Tested - Configuration Documentation

EUT Configuration											
Work Order: N3235 Company: Powercast Corporation Company Address: 566 Alpha Drive Pittsburgh, PA 15238 Contact: Charlie Greene											
MN					SN						
EUT: LS1400					Sample 1						
EUT Description: Light Sensor EUT Max Frequency: <108MHz EUT TX Frequency: 902-928MHz											
Support Equipment:					MN						SN
none											
EUT Ports:											
Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason	
none											
Software / Operating Mode Description:											
EUT is transmitting on one of three pre-programmed channels between 902-928MHz.											



Statement of Conformity

The LS1400 has been found to conform to the following parts of 47 CFR and as detailed below:

RSS-GEN	RSS 210	Part 15	Comments
5.3		15.15(b)	There are no controls accessible to the user that varies the output power above specified limits.
5.2		15.19	The label is shown in the label exhibit.
7.1.5		15.21	Information to the user is shown in the instruction manual exhibit.
		15.27	No special accessories are required for compliance.
		15.31	The EUT was tested in accordance with the measurement standards in this section.
		15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
		15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
7.1.4		15.203	EUT employs a unique antenna connector.
	2.6	15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
7.2.2		15.207	Not Applicable since EUT is battery powered.
	Annex 8	15.247	The unit complies with the requirements of 15.247
4.6.1		15.247	Occupied Bandwidth measurements were made.



Test Results

Bandwidth

LIMIT

The minimum 6 dB bandwidth shall be at least 500 kHz. [15.247(a) (2)]

MEASUREMENTS / RESULTS

Engineer	Tuyen Truong A.
Date	12/27/2013
Site	Chamber 2
Environmental Conditions	22.4°C, 5%, 1013mb

6dB Bandwidth

15:247(a)(2): Specifies that the minimum 6dB bandwidth shall be at least 500kHz.

Frequency (MHz)	Mode	6dB BW (MHz)	Limit (kHz)	Margin (MHz)
902	DMSS	0.5875	>500	-0.088
915	DMSS	0.6750	>500	-0.175
927	DMSS	0.6500	>500	-0.150

Tested by: Tuyen Truong **RBW =** 100KHz **VBW =** 300KHz
Date: 12/27/2014 **Analyzer:** SA 1327
Company: Powercast Corporation
EUT: LS1400

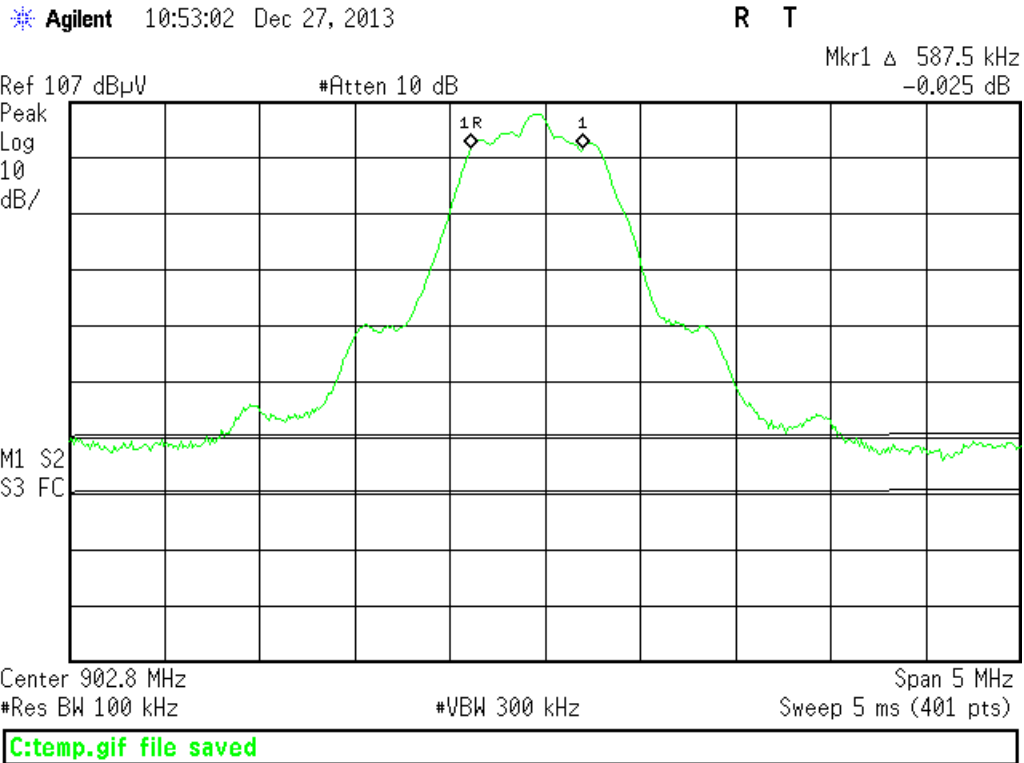
Rev. 1/3/2014

Equipment	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Spectrum Analyzers / Receivers/Preselectors SA EMI Chamber (1327)	9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	5/30/2014	5/30/2013
Radiated Emissions Sites EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 30-1000MHz		Cat II	Calibration Due 2/15/2014	Calibrated on 2/15/2012
Preamps/Couplers Attenuators / Filters Green	Range 0.009-2000MHz	MN ZFL-1000-LN	Mfr CS	SN N/A	Asset 802	Cat II	Calibration Due 9/24/2014	Calibrated on 9/24/2013
Antennas Red-Black Bilog	Range 30-2000MHz	MN JB1	Mfr Sunol	SN A091604-2	Asset 1106	Cat I	Calibration Due 1/28/2015	Calibrated on 1/28/2013
Meteorological Meters Temp./Humidity/Atm. Pressure Gauge TH A#1832		MN 7400 Perception II 35519-044	Mfr Davis Control Company	SN N/A 130318277	Asset 965 1832	Cat I II	Calibration Due 5/29/2014 6/13/2015	Calibrated on 5/29/2013 6/13/2013
Cables Asset #1782 Asset #1787	Range 9kHz - 18GHz 9kHz - 18GHz		Mfr Florida RF Florida RF			Cat II II	Calibration Due 3/6/2014 3/14/2014	Calibrated on 3/6/2013 3/14/2013

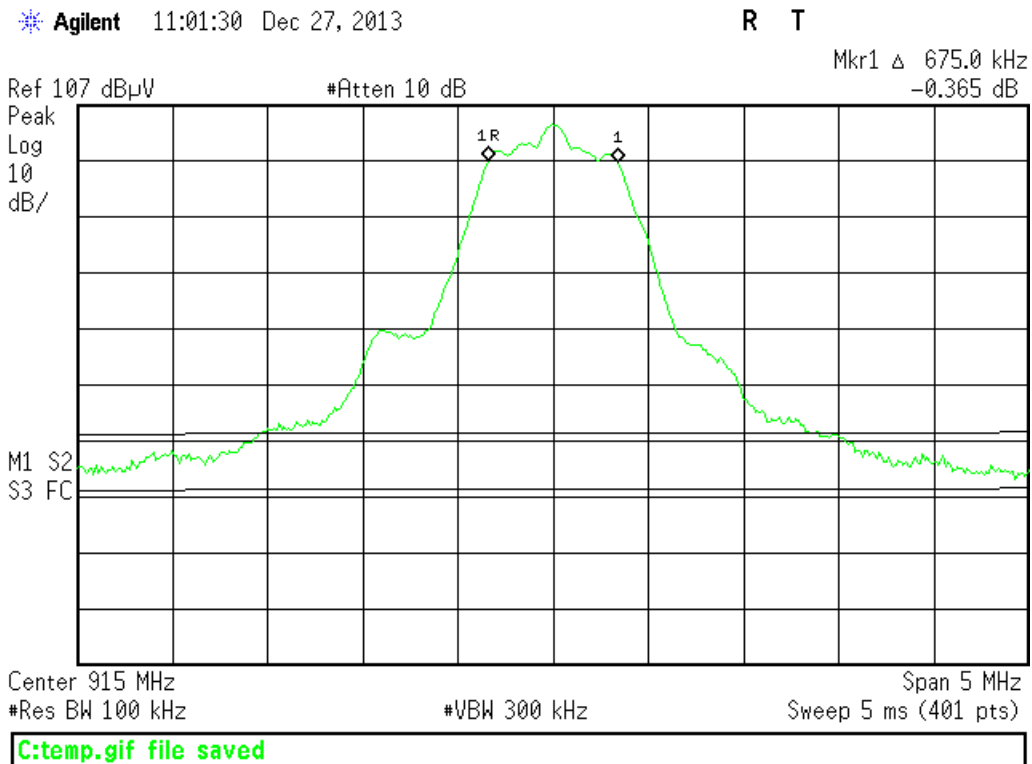
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



PLOT



Low Channel – 6dB Bandwidth



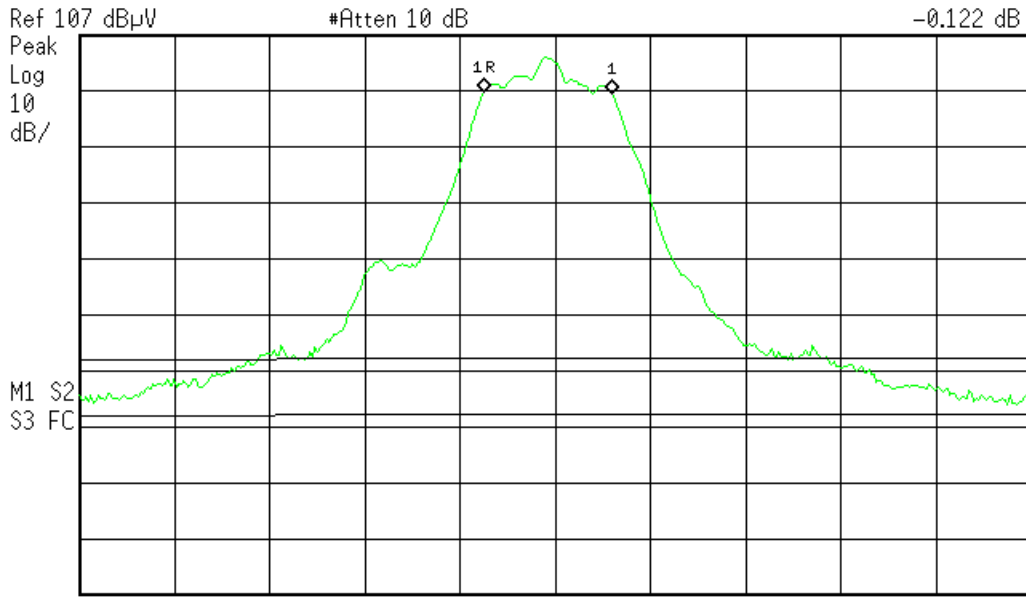
Mid Channel – 6dB Bandwidth



Agilent 11:07:41 Dec 27, 2013

R T

Mkr1 Δ 675.0 kHz
-0.122 dB



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High Channel – 6 dB Bandwidth



Fundamental Emission Output Power

LIMIT

Conducted Output Power

1 Watt

[15.247(b) (3)]

MEASUREMENTS / RESULTS

Engineer	Chris Bramley
Date	12/27/2013
Site	Chamber 2
Environmental Conditions	25.7°C, 5%, 1015mb

DTS Method 9.2.2.2 Method AVGSA-1 (Trace averaging with the EUT transmitting at full power throughout each sweep)

Maximum Conducted (average) Output Power							
Tested by: Chris Bramley		Date: 12/27/2013			Analyzer: Asset# 1327		WO: N3532
Company: Powercast Corporation		EUT: LS1400			Operating Voltage: 3.6Vdc		RBW = 30KHz VBW = 100KHz Limit = 1Watt or 30dBm
TX Mode: DMSS		Antenna Gain: 2.5dBi					
Channel (MHz)	Radiated Channel power (dBm)	Conducted Output power (dBm)	Limit (dBm)	Margin (dB)	Result		
902.7	5.84	3.34	30	-26.66	pass		
914.22	4.14	1.64	30	-28.36	pass		
919.3	3.64	1.14	30	-28.86	pass		

Note: Field strengths measured were converted to equivalent EIRP or Radiated Channel Power, then subtract with 2.5dBi antenna gain to obtain Conducted Output power (see Plots).

$$\text{EIRP (dBm)} = \text{Emeas adjusted dBuV/m} + 20 \cdot \text{LOG}(3\text{m}) - 104.7$$

$$\text{Emeas adjusted} = \text{Reading SA} - \text{dB (Equipment Correction Factor)}$$

Rev. 1/3/2014

Category	Item	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Spectrum Analyzers / Receivers / Preselectors	SA EMI Chamber (1327)	9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	5/30/2014	5/30/2013
	Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
	EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	2/15/2014	2/15/2012
Preamps/Couplers Attenuators / Filters	Green	0.009-2000MHz	ZFL-1000-LN	CS	N/A	802	II	9/24/2014	9/24/2013
	Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
	Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	1/28/2015	1/28/2013
Meteorological Meters	Temp./Humidity/Atm. Pressure Gauge		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
	TH A#1832		7400 Perception II	Davis	N/A	965	I	5/29/2014	5/29/2013
			35519-044	Control Company	130318277	1832	II	6/13/2015	6/13/2013
Cables	Asset #1782	9kHz - 18GHz		Mfr			Cat	Calibration Due	Calibrated on
	Asset #1787	9kHz - 18GHz		Florida RF			II	3/6/2014	3/6/2013
				Florida RF			II	3/14/2014	3/14/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



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PLOTS (radiated channel power)

Agilent 17:22:27 Dec 27, 2013 R T

Ch Freq 902.67 MHz **Trig** Free

Channel Power

Ref 107 dB μ V #Atten 10 dB

#Avg Log 10 dB/

Center 902.7 MHz Span 1.5 MHz
#Res BW 30 kHz #VBW 100 kHz Sweep 8 ms (401 pts)

Channel Power	Power Spectral Density
102.29 dB μ V	42.80 dB μ V/Hz

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Meas Setup

Avg Number 100
On Off

Avg Mode Exp Repeat

Integ BW 890.000 kHz

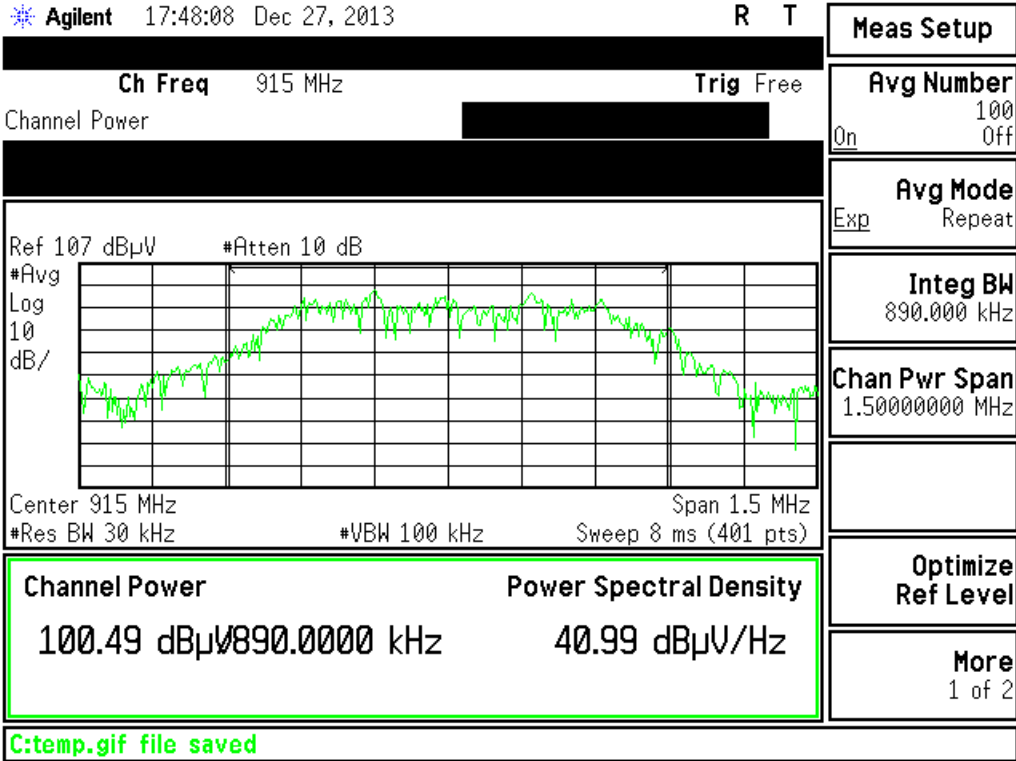
Chan Pwr Span 1.5000000 MHz

Optimize Ref Level

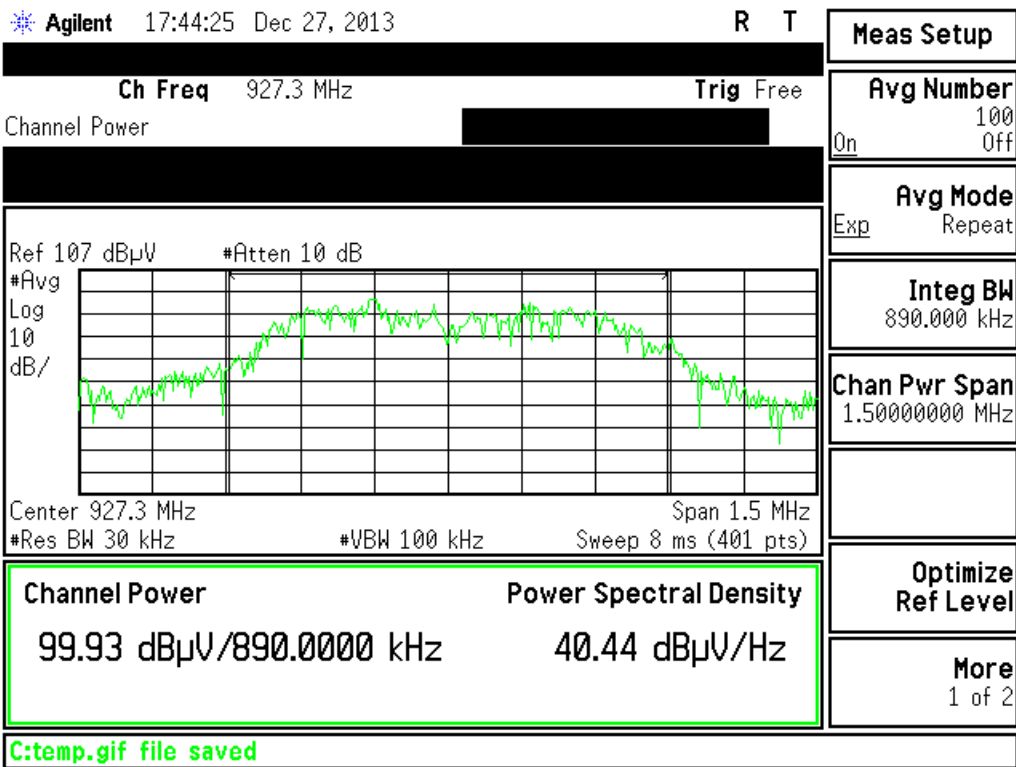
More 1 of 2

Low Channel – Channel Power





Mid Channel – Channel Power



High Channel – Channel Power



Radiated Spurious Emissions

LIMITS

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth that contains the highest level of desired power based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB etc.

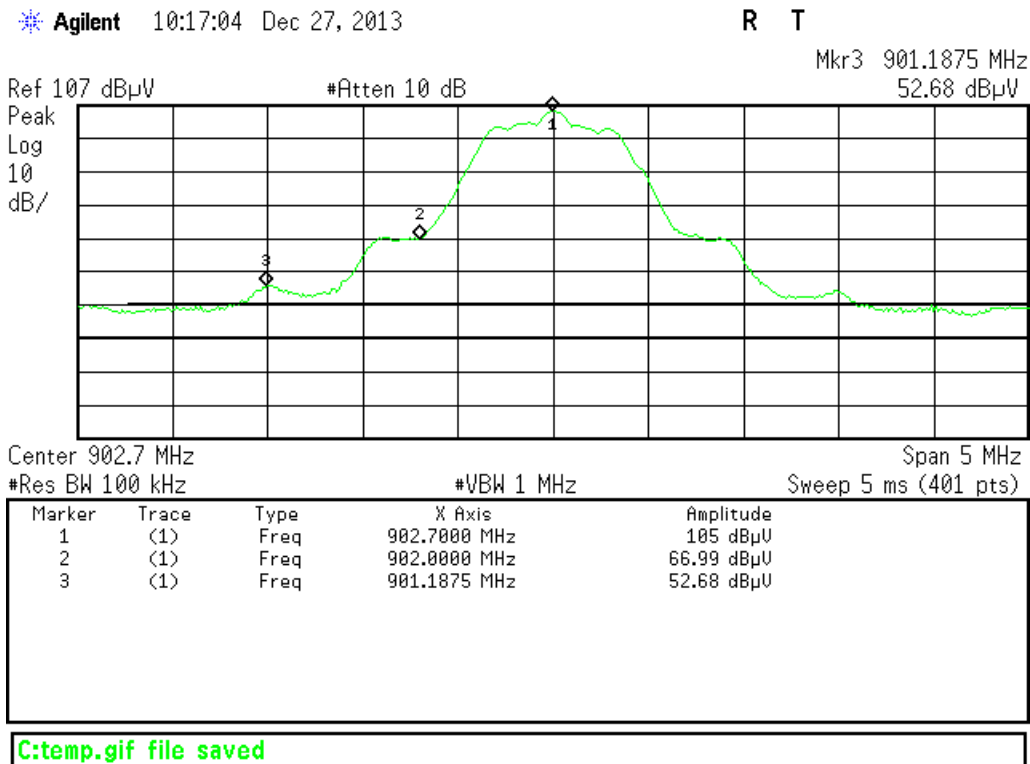
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

[15.247(d)]

MEASUREMENTS / RESULTS

Plots

Radiated Band Edge

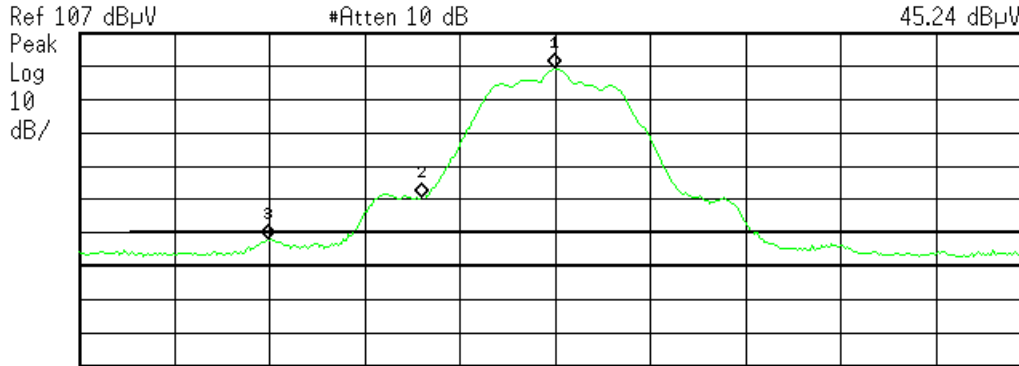


Lower Channel – Band-edge (<-30dBm) – Horizontal Polarity

Agilent 10:12:22 Dec 27, 2013

R T

Mkr3 901.1875 MHz
45.24 dBµV



Center 902.7 MHz #Res BW 100 kHz #VBW 1 MHz Span 5 MHz Sweep 5 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	902.7000 MHz	96.34 dBµV
2	(1)	Freq	902.8000 MHz	57.75 dBµV
3	(1)	Freq	901.1875 MHz	45.24 dBµV

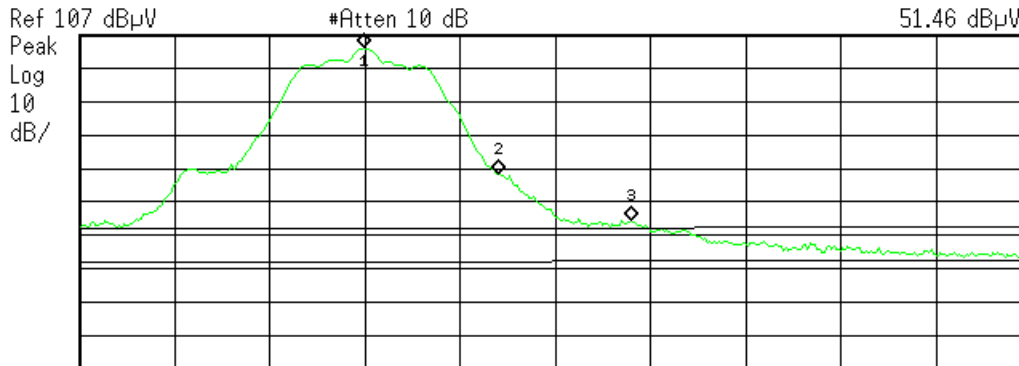
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Lower Channel – Band-edge (<-30dBm) – Vertical Polarity

Agilent 10:35:35 Dec 27, 2013

R T

Mkr3 928.7000 MHz
51.46 dBµV



Center 928.3 MHz #Res BW 100 kHz #VBW 1 MHz Span 5 MHz Sweep 5 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	927.3000 MHz	103 dBµV
2	(1)	Freq	928.0000 MHz	65.29 dBµV
3	(1)	Freq	928.7000 MHz	51.46 dBµV

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Upper Channel – Band-edge (<-30dBm) – Horizontal Polarity



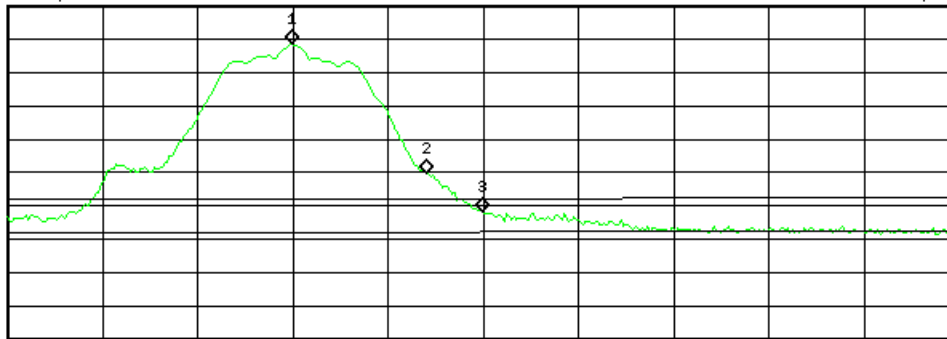
Agilent 10:38:36 Dec 27, 2013

R T

Mkr3 928.3000 MHz
45.31 dBμV

Ref 107 dBμV
Peak
Log
10
dB/

#Atten 10 dB



Center 928.3 MHz

Span 5 MHz

#Res BW 100 kHz

#VBW 1 MHz

Sweep 5 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	927.3000 MHz	95.48 dBμV
2	(1)	Freq	928.0000 MHz	56.54 dBμV
3	(1)	Freq	928.3000 MHz	45.31 dBμV

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Upper Channel – Band-edge (<-30dBm) – Vertical Polarity



Radiated Spurious Emission Data

Radiated Emissions Table												
Date: 26-Dec-13			Company: Powercast Corporation				Work Order: N3532					
Engineer: Chris Bramley			EUT Desc: LS1400 - Light Sensor				EUT Operating Voltage/Frequency: 3.6Vdc					
Temp: 23.7°C			Humidity: 13%		Pressure: 1011mBar							
Frequency Range: 30-1000MHz						Measurement Distance: 3 m						
Notes: EUT Transmitting on Low channel - 902.7MHz						EUT Max Freq: <108MHz EUT TX Freq: 902-928MHz						
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	---			FCC Class B		
							Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
v	47.98	25.5	25.6	8.7	0.5	9.1	---	---	---	40.0	-30.9	Pass
v	58.9	22.7	25.6	7.1	0.5	4.7	---	---	---	40.0	-35.3	Pass
h	122.7	24.5	25.6	14.0	0.8	13.7	---	---	---	43.5	-29.8	Pass
v	172.0	25.4	25.7	11.3	0.9	11.9	---	---	---	43.5	-31.6	Pass
v	196.0	25.5	25.6	11.7	0.9	12.5	---	---	---	43.5	-31.0	Pass
v	454.0	23.6	25.8	17.0	1.5	16.3	---	---	---	46.0	-29.7	Pass
h	466.4	34.8	25.8	17.3	1.5	27.8	---	---	---	46.0	-18.2	Pass
h	490.9	24.6	25.9	17.8	1.5	18.0	---	---	---	46.0	-28.0	Pass
h	515.5	23.8	25.9	17.7	1.5	17.1	---	---	---	46.0	-28.9	Pass
h	564.6	22.6	25.8	18.6	1.7	17.1	---	---	---	46.0	-28.9	Pass
h	613.6	21.0	25.9	19.0	1.7	15.8	---	---	---	46.0	-30.2	Pass
h	662.7	23.5	25.8	19.9	1.8	19.4	---	---	---	46.0	-26.6	Pass
h	899.3	26.3	25.8	22.4	2.1	25.0	---	---	---	46.0	-21.0	Pass
Table Result: Pass by -18.2 dB Worst Freq: 466.4 MHz												
Test Site: EMI Chamber 2			Cable 1: Asset #1782				Cable 2: Asset #1787					
Analyzer: Rental SA#2			Preamp: Green				Antenna: Red-Black					

Rev. 1/3/2014

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental SA #2 (1860)	9kHz-26.5 GHz	E7405A	Agilent	MY45104916	1860	I	4/15/2014	4/15/2013
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Cat	Calibration Due	Calibrated on	
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz	II	2/15/2014	2/15/2012	
Preamps/Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Green	0.009-2000MHz	ZFL-1000-LN	CS	N/A	802	II	9/24/2014	9/24/2013
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	1/28/2015	1/28/2013
Meteorological Meters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Temp./Humidity/Atm. Pressure Gauge TH A#1833	7400 Perception II	35519-044	Davis Control Company	N/A 130318278	965 1833	I II	5/29/2014 6/13/2015	5/29/2013 6/13/2013
Cables	Range	Mfr	Cat	Calibration Due	Calibrated on			
Asset #1782	9kHz - 18GHz	Florida RF	II	3/6/2014	3/6/2013			
Asset #1787	9kHz - 18GHz	Florida RF	II	3/14/2014	3/14/2013			

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Radiated Emissions Table														
Date: 03-Jan-14			Company: Powercast Corporation				Work Order: N3532							
Engineer: Tuyen Truong			EUT Desc: LS1400				EUT Operating Voltage/Frequency: 3.6Vdc							
Temp: 23.5°C			Humidity: 2%		Pressure: 1010mBar									
Frequency Range: 1 to 10GHz						Measurement Distance: 3 m								
Notes: All 3 orientations of EUT were checked.						EUT Max Freq: <108MHz EUT TX Freq: 902-928MHz								
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
v	1075.0	34.07	24.3	19.6	25.6	2.2	42.3	32.5	74.0	-31.7	Pass	54.0	-21.5	Pass
h	2437.5	38.8	32.6	18.7	28.8	3.4	52.3	46.1	74.0	-21.7	Pass	54.0	-7.9	Pass
v	2975.0	34.98	23.2	18.3	30.3	3.7	50.7	38.9	74.0	-23.3	Pass	54.0	-15.1	Pass
v	3425.0	36.54	23.8	18.1	31.3	4.2	53.9	41.2	74.0	-20.1	Pass	54.0	-12.8	Pass
h	3612.5	35.5	26.9	18.2	31.6	4.4	53.3	44.7	74.0	-20.7	Pass	54.0	-9.3	Pass
v	4200.0	33.26	22.0	17.6	32.2	5.0	52.9	41.6	74.0	-21.1	Pass	54.0	-12.4	Pass
v	5326.5	33.46	21.0	17.2	34.4	5.6	56.3	43.8	74.0	-17.7	Pass	54.0	-10.2	Pass
Table Result: Pass by -7.9 dB Worst Freq: 2437.5 MHz														
Test Site: EMI Chamber 2			Cable 1: Asset #1782				Cable 2: Asset #1787			Cable 3: ---				
Analyzer: SA#2			Preamp: Brown				Antenna: Black Horn			Preselector: ---				



Equipment Category	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Spectrum Analyzers / Receivers / Preselectors Rental SA #2 (1860)	9kHz-26.5 GHz	E7405A	Agilent	MY45104916	1860	I	4/15/2014	4/15/2013
Radiated Emissions Sites EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 30-1000MHz		II	2/15/2014	2/15/2012
Preamps / Couplers Attenuators / Filters Brown	Range 1-18GHz	MN CS	Mfr CS	SN N/A	Asset 1523	II	2/27/2014	2/27/2013
Antennas Black Horn	Range 1-18GHz	MN 3115	Mfr EMCO	SN 9703-5148	Asset 56	I	8/5/2015	8/5/2013
Meteorological Meters Temp./Humidity/Atm. Pressure Gauge TH A#1833		MN 7400 Perceptor 35519-044	Mfr Davis Control Company	SN N/A 130318278	Asset 965 1833	I II	5/29/2014 6/13/2015	5/29/2013 6/13/2013
Cables Asset #1782 Asset #1787	Range 9kHz - 18GHz 9kHz - 18GHz		Mfr Florida RF Florida RF			II II	3/6/2014 3/14/2014	3/6/2013 3/14/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Power Spectral Density

LIMIT

...the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. [15.247(e)]

MEASUREMENTS / RESULTS

Engineer	Chris Bramley
Date	12/27/2013
Site	Chamber 2
Environmental Conditions	25.7°C, 5%, 1015mb

DTS Method 10.3 AVGPS-1 (trace averaging with EUT transmitting at full power throughout each sweep)

Power Spectral Density Data

15.247 (e) Maximum Power Spectral Density								
Tested by: Chris Bramley								
Date: 12/27/2013 SA#: 1327								
Company: Powercast Corp. RBW = 3KHz								
EUT: LS1400 Antenna Gain: 2.5dBi VBW = 10KHz								
channel (MHz)	mode	measured PSD (dBm)	attenuator factor (dB)	conducted power measurement	bandwidth correction factor	limit (dBm)	margin (dB)	result
902	DMSS	-8.16	0	-10.66	0	8	-18.66	Pass
915	DMSS	-9.56	0	-12.06	0	8	-20.06	Pass
927	DMSS	-8.76	0	-11.26	0	8	-19.26	Pass

Note: Field strengths measured were converted to equivalent EIRP for measured Power Spectral Density, then subtract with 2.5dBi antenna gain to obtain Conducted power measurement (see Plots).

$$EIRP (dBm) = E_{meas} \text{ adjusted } dBuV/m + 20 * LOG(3m) - 104.7$$

$$E_{meas} \text{ adjusted} = \text{Reading SA} - dB \text{ (Equipment Correction Factor)}$$

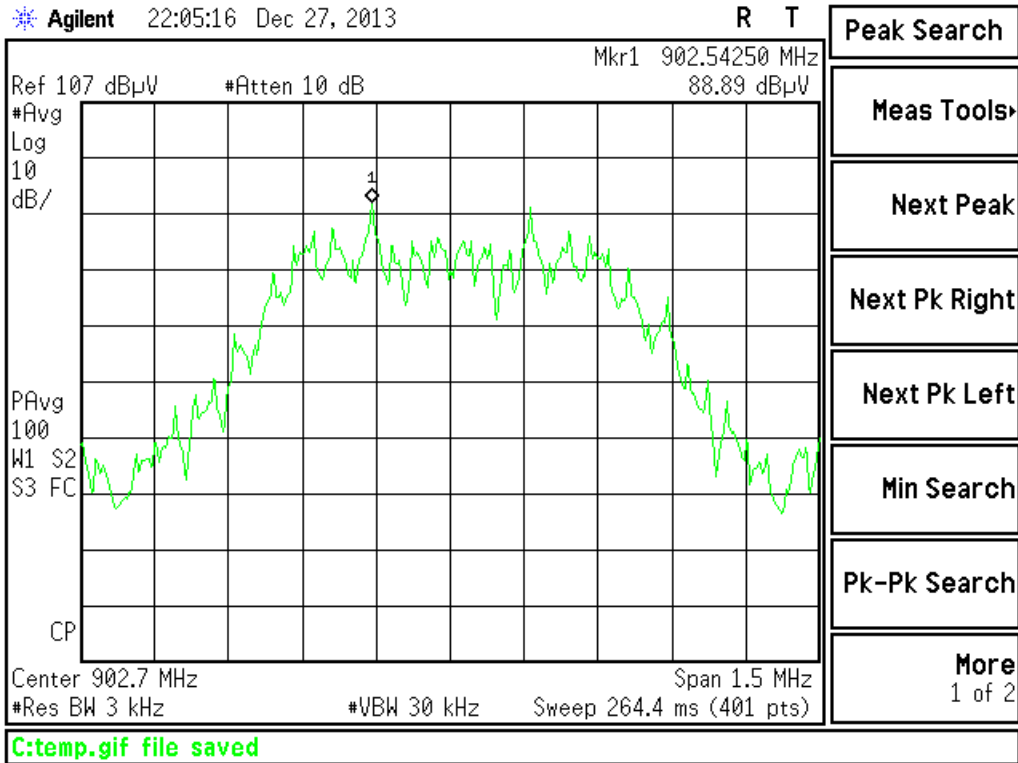
Rev. 1/3/2014

Spectrum Analyzers / Receivers / Preselectors SA EMI Chamber (1327)	Range 9kHz-13.2 GHz	MN E4405B	Mfr Agilent	SN MY45103416	Asset 1327	Cat I	Calibration Due 5/30/2014	Calibrated on 5/30/2013
Radiated Emissions Sites EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 30-1000MHz		Cat II	Calibration Due 2/15/2014	Calibrated on 2/15/2012
Preamps / Couplers Attenuators / Filters Green	Range 0.009-2000MHz	MN ZFL-1000-LN	Mfr CS	SN N/A	Asset 802	Cat II	Calibration Due 9/24/2014	Calibrated on 9/24/2013
Antennas Red-Black Bilog	Range 30-2000MHz	MN JB1	Mfr Sunol	SN A091604-2	Asset 1106	Cat I	Calibration Due 1/28/2015	Calibrated on 1/28/2013
Meteorological Meters Temp./Humidity/Atm. Pressure Gauge TH A#1832		MN 7400 Perception II 35519-044	Mfr Davis Control Company	SN N/A 130318277	Asset 965 1832	Cat I II	Calibration Due 5/29/2014 6/13/2015	Calibrated on 5/29/2013 6/13/2013
Cables Asset #1782 Asset #1787	Range 9kHz - 18GHz 9kHz - 18GHz		Mfr Florida RF Florida RF			Cat II II	Calibration Due 3/6/2014 3/14/2014	Calibrated on 3/6/2013 3/14/2013

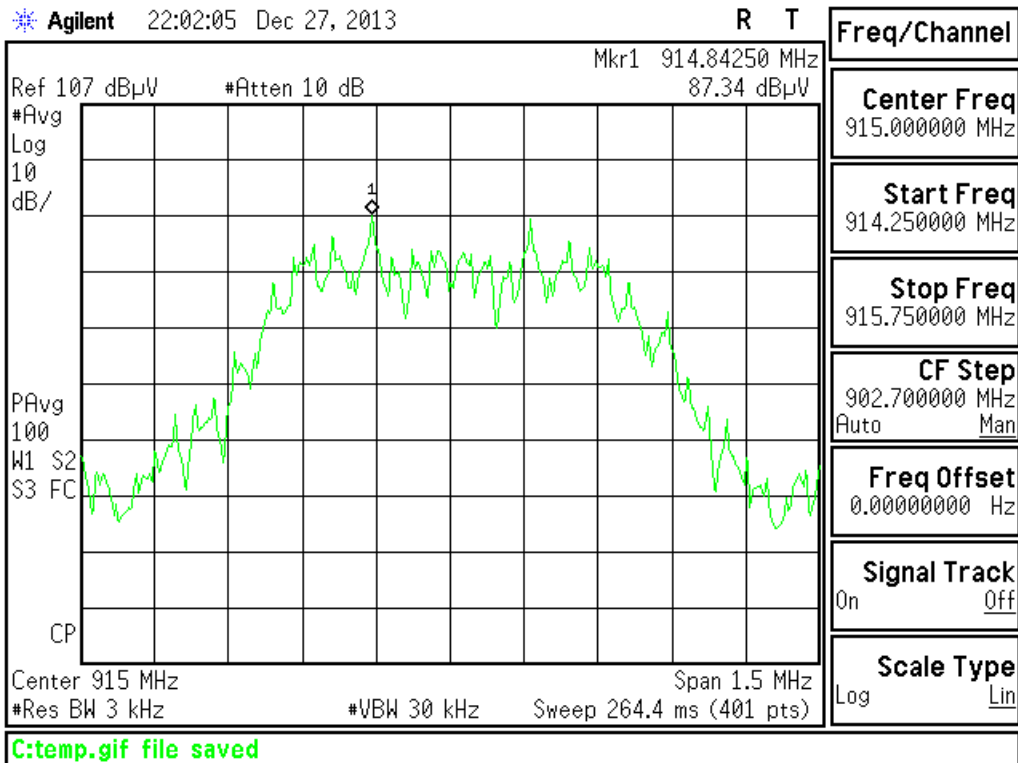
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



PLOTS

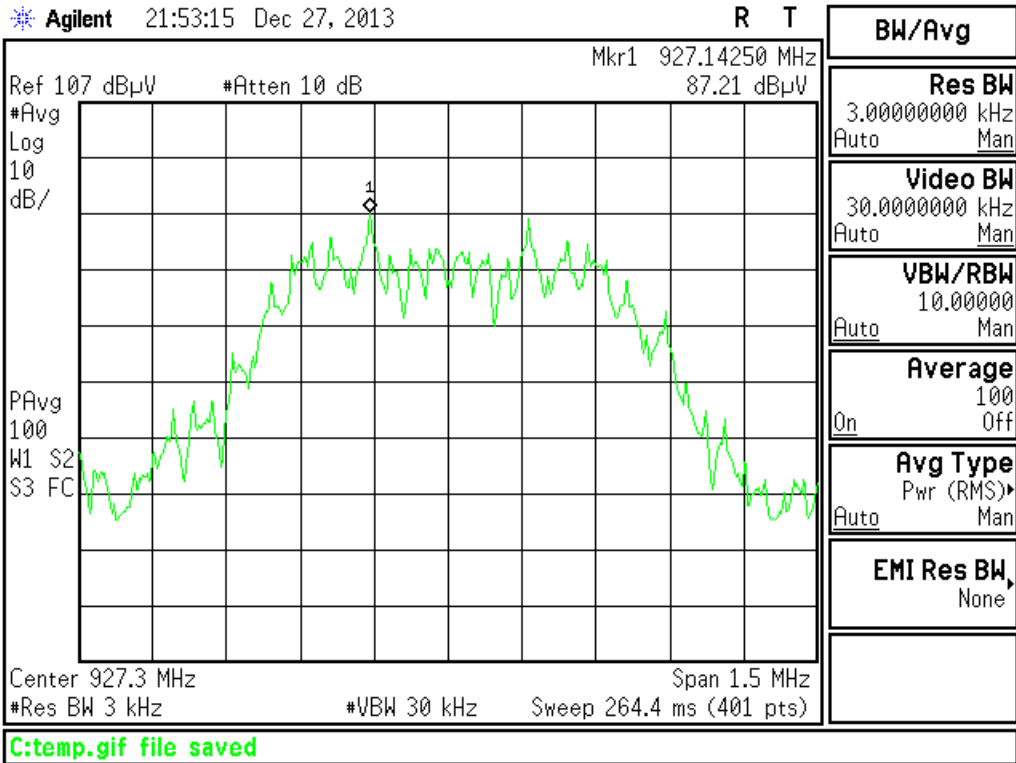


Channel Low – PSD



Channel Mid – PSD





Channel High – PSD



Occupied Bandwidth

REQUIREMENT

When an occupied bandwidth is no specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
[RSS-GEN 4.6.1]

Engineer	Tuyen Truong
Date	1/10/2014
Site	Chamber 2
Environmental Conditions	25.7°C, 5%, 1015mb



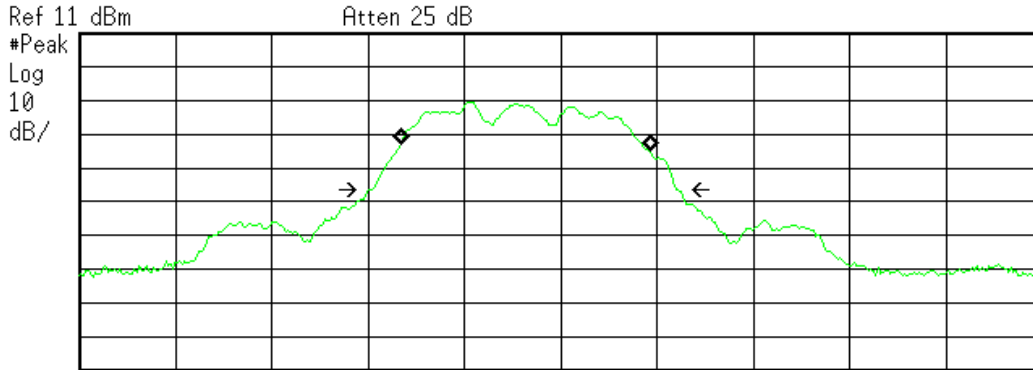
BUREAU
VERITAS



Plots

Agilent 13:29:27 Jan 10, 2014

R T



Center 902.8 MHz Span 3 MHz
 #Res BW 30 kHz #VBW 100 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 772.5161 kHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

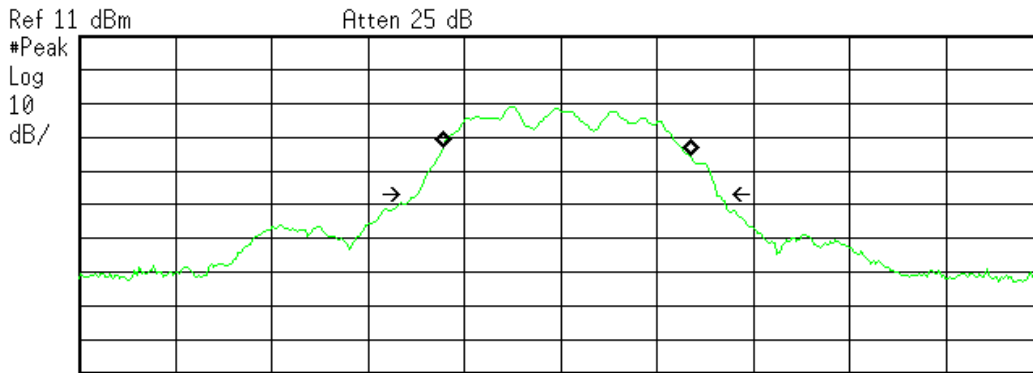
Transmit Freq Error -112.257 kHz
 x dB Bandwidth 951.718 kHz

C:\temp.gif file saved

Low Channel – Occupied Bandwidth

Agilent 15:19:08 Jan 10, 2014

R T



Center 915 MHz Span 3 MHz
 #Res BW 30 kHz #VBW 100 kHz Sweep 5 ms (401 pts)

Occupied Bandwidth
 768.7988 kHz

Occ BW % Pwr 99.00 %
 x dB -26.00 dB

Transmit Freq Error 16.869 kHz
 x dB Bandwidth 934.124 kHz

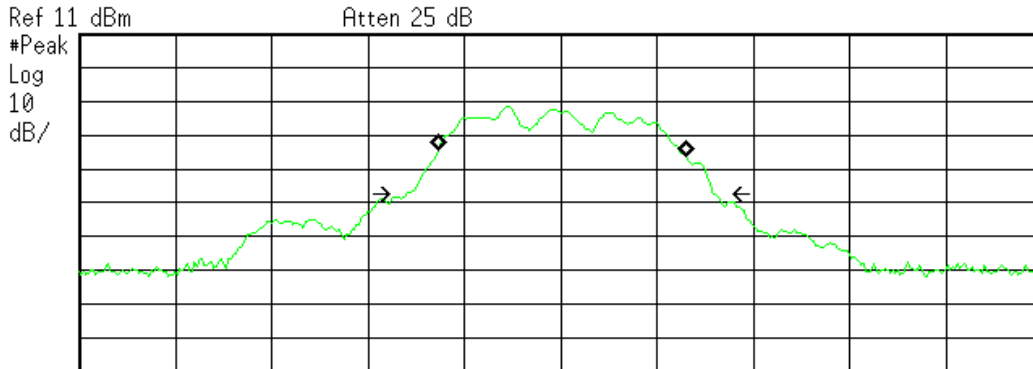
C:\temp.gif file saved

Mid Channel – Occupied Bandwidth



Agilent 15:21:41 Jan 10, 2014

R T



Occupied Bandwidth
774.2388 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 4.411 kHz
x dB Bandwidth 964.583 kHz

C:\temp.gif file saved

High Channel – Occupied Bandwidth

Rev. 1/9/2014

Category	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Spectrum Analyzers / Receivers / Preselectors								
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/18/2014	3/18/2013
Radiated Emissions Sites								
EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 30-1000MHz		II	2/15/2014	2/15/2012
Preamps / Couplers Attenuators / Filters								
Green	Range 0.009-2000MHz	MN ZFL-1000-LN	Mfr CS	SN N/A	Asset 802	II	9/24/2014	9/24/2013
Antennas								
Red-Black Bilog	Range 30-2000MHz	MN JB1	Mfr Sunol	SN A091604-2	Asset 1106	I	1/28/2015	1/28/2013
Meteorological Meters								
Temp./Humidity/Atm. Pressure Gauge		MN 7400 Perception II	Mfr Davis	SN N/A	Asset 965	I	5/29/2014	5/29/2013
TH A#1833		35519-044	Control Company	SN 130318278	Asset 1833	II	6/13/2015	6/13/2013
Cables								
Asset #1782	Range 9kHz - 18GHz		Mfr Florida RF			II	3/6/2014	3/6/2013
Asset #1787	Range 9kHz - 18GHz		Mfr Florida RF			II	3/14/2014	3/14/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



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Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz)		
NIST	5.6dB	N/A
CISPR	4.6dB	5.2dB (Ucisprr)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucisprr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation:		
• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4%	5%
Adjacent channel power	0.3dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	1.9dB	3dB
Conducted emission of receivers	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		



Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and "CURTIS-STRAUS" (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.



13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

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